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AUTHOR Kay, Patricia M.; Byrne, Michael M.
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ABSTRACT

The rapid proliferation of the use of computers in schools has led to questions about how teachers should be educated to deal with the new technology and what all teachers should be required to demonstrate in the way of minimal essential computer skills as a condition of certification. This paper addresses these questions by proposing a set of computer survival skills that all teachers ought to possess and should be incorporated into teacher preparation programs. Without defining the way in which instruction should be delivered or competence developed, it is proposed that teachers have competence in operating computer equipment, in programming, in the diverse uses of computers, and in understanding the ethical, moral, and philosophical implications of computer use. (JD)

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ESSENTIAL COMPUTER COMPETENCE FOR BEGINNING TEACHERS

Patricia M. Kay

Michael M. Byrne

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ESSENTIAL COMPUTER COMPETENCE FOR BEGINNING TEACHERS

Patricia M. Kay and Michael M. Byrne
Baruch College - CUNY Long Island University

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In 1983, almost seventy-nine percent of the schools in New York State were using microcomputers for instructional purposes. Nationally, the number of computers in schools doubled from the fall of 1982 to the fall of 1983.* This rapid proliferation of the use of computers in schools coupled with the popularity of home computers and the growing computer sophistication of students has led to important questions about how teachers should be educated to deal with the new technology and what all teachers should be required to demonstrate in the way of minimal essential computer skills as a condition of certification.

This paper addresses these questions by proposing a set of computer survival skills that all teachers ought to possess and that should be incorporated into teacher preparation programs. This set of competencies is intended to be a starting point to generate serious discussion within the New York State education community that could lead to statewide agreement about minimum essential computer competence for beginning teachers.

The approach to outlining this set of competencies is a personal one: that is, it addresses questions of competence from

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* Toch, Thomas "Number of Computers in Schools Doubles" Education Week, III:30, 1984

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the point of view of how computers can be most useful to teachers personally while insuring that they have an elementary understanding and appreciation of the full range of the powerful uses of computers both in education and in general. Because this is the approach taken, much that is currently "popular" in introductory computer courses is not addressed. For example, knowledge of the history of computers is not included since it is not essential knowledge for personal or classroom computer use.

It is important to note that what is outlined here is about what can be addressed in a three-credit course. Both authors currently teach three-credit courses that are intended to develop these competencies. This information is not included here out of a strong conviction that all teacher preparation programs should deliver such courses or that a three-credit course ought to be required for certification. The information is included simply because it may be helpful in defining the level of competence in each of the areas addressed as being minimal rather than expert.

Without defining the way in which instruction should be delivered or competence developed then, it is proposed that all candidates for teacher certification be able to demonstrate the following essential computer competencies:

1. COMPETENCE IN OPERATING COMPUTER EQUIPMENT:

Teachers must be able to use computers in much the same way as they currently are able to use other instructional aids such as phonographs, tape recorders, film projectors, and other mechanical equipment. In other words, they need to know how to turn a computer on, load and run programs, and produce output.

Because all computers are not identical, teachers should know the differences of several different kinds of systems commonly found in the classroom. This knowledge need not be highly technical but more at the level of being able to give simple explanations of, for example, why Apple equipment doesn't run Commodore software.

At a common sense level, teachers should be able to diagnose malfunctions. This does not mean that they need instruction in electronics but simply that if, for example, the computer doesn't "boot", or if the printer fails to print, they know enough to check that the proper commands have been issued, that cables are connected, that appropriate software is being used, or that the device is plugged in.

Teachers need to know the limits of their diagnostic capabilities and who or what to turn to if problems are beyond those capabilities. In this respect, they should be able to read and follow instructions in non-technical manuals that accompany equipment or software, and they should be able to clearly explain problems with equipment or software to appropriate resource people.

2. COMPETENCE IN PROGRAMMING:

Teachers do not need to be able to produce computer programs, but they do need to have a concept of what programming is and how it "works." They should have an appreciation of programming as logical structure and process with the capability of iteration. This is probably best accomplished through learning simple command structures in any programming language

and inspecting examples of how these structures may be used for different purposes. They should understand the limitations of programming (rigid syntax, fixed structure, etc.) and the strengths (logical, repetitive, problem solving, organization, etc.)

3. COMPETENCE IN USES OF COMPUTERS:

A. Word processing is perhaps the most personally valuable computer application for all teachers. They should be able to use word processing to produce simple memoranda, notes, worksheets, and tests. They should be able to edit existing files. They should have an appreciation of the power of word processing applications to merge files, to search for and replace data, and to move data about within a document or between documents. Further, they should be able to assist (not necessarily teach) students to use word processing.

B. Spreadsheet applications have a number of uses in education, can save teachers enormous amounts of time, and illustrate the power of the computer for iterative numerical analyses. Teachers should understand how spreadsheets work and know how to use them for simple applications (e.g., grading, developing simple project budgets). They should appreciate the power of spreadsheet applications for testing hypotheses.

C. It is critical that teachers have some understanding about the use of computers for storing and organizing information. Teachers should be able to use simple database managers for personal uses (e.g., for keeping addresses and telephone numbers, or for organizing student information, or for

cataloging a classroom library). They should demonstrate competence in developing a simple database, searching for data, and organizing it into meaningful information.

D. The information available through on-line bibliographic and nonbibliographic databases can be helpful to teachers in planning and conducting instruction, but it can only be helpful if teachers learn to access it. They should have an elementary understanding and appreciation of on-line databases and the telecommunications skills to access them. They should know what kinds of databases (general and specialized) are available for educators and how to access them either personally or through resource people.

E. Teachers should be able to identify the major current applications of computers for instruction and be able to determine the strengths and weaknesses of each of them as they relate to the enterprise of schooling. They should be able to effectively integrate good instructional applications into existing curricula. Additionally, they need to have an understanding and appreciation of the pitfalls and promise of future uses of computers in education.

4.) ETHICAL/MORAL/PHILOSOPHICAL COMPETENCE:

There are and will continue to be a number of ethical, moral, and philosophical concerns attending the use of computers in schools that teachers must be aware of and able to deal with. For example, teachers need to know the legal constraints on the use of software and demonstrate that they can model their behavior accordingly. They must be aware of the growing gender

and socioeconomic gaps in the use of computers among young people, be sensitive to the probable causes, and appreciate classroom, school building, and district strategies for the fair use of computers in education. If any of these concerns are not dealt with by teachers at the classroom level, it is not likely that they will be addressed in general.